

PLUG VALVE AND COMBUSTION DEVICE HAVING SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Chinese Patent Application No. 202111235855.9, entitled “PLUG VALVE AND COMBUSTION DEVICE HAVING SAME” and filed on
5 October 22, 2021, the entire contents of which are incorporated herein by reference.

FIELD

[0002] The present disclosure relates to the field of household appliances, and particularly, to a plug valve and a combustion device having the same.

BACKGROUND

10 [0003] A gas valve is a core component of a household gas cooker and has main functions of sealing, gas flame intensity adjustment, ignition, and the like. In addition, operation hand feeling of the gas valve is directly sensed by a user. Moreover, the quality of the gas valve determines the quality of the cooker.

[0004] Existing common gas plug valves are common plug valves predominantly, i.e., have
15 a high overall height that is generally greater than 55mm and an overall structure in form of a structure in patent CN107355556A. Owing to the height of the plug valve, its integration within the gas cooker results in a high overall height of the whole gas cooker. In this way, it is inconvenient to save an internal space of the cooker, leading to a low space utilization rate of a cabinet at a bottom of the cooker.

20 [0005] An existing ultra-thin valve is complex in structure, inconvenient to install, and has limitations.

[0006] For example, in patent CN105402429A, an outer ring gas outlet channel of the valve is located at a right rear side of a valve body, at which a gas outlet pipe needs to be connected

to an inner ring burner, causing a center distance between two knobs of the cooker to be increased. Therefore, an appearance of the cooker is affected. Moreover, a distance between the knob and the burner is smaller after the center distance is increased, which causes an increase in a temperature rise of the knob, affecting a user experience.

- 5 **[0007]** For example, in patent CN207961707U, the outer ring gas outlet of the patent is also located at the right rear side of the valve body, at which the gas outlet pipe needs to be connected. In this way, it also faces the above problems. For another example, in patent CN209196174U, the outer ring gas outlet of the patent is also located at the right rear side of the valve body, at which the gas outlet pipe needs to be connected. In this way, it also faces the above problems.
- 10 Because the ultra-thin valve has an ultra-thin structure, a height of an internal valve core is small. Maximum rotation angles of the valve bodies of the above patents are each smaller than 180°, which is inconvenient to an adjustment on required flame intensity, affecting the user experience.

SUMMARY

- 15 **[0008]** The present disclosure aims to solve at least one of the technical problems existing in the related art. To this end, an objective of the present disclosure is to provide a plug valve. The plug valve has a compact valve body structure. In this way, it is beneficial to realizing miniaturization of the valve body. Moreover, the valve body is thin. In this way, an internal space of a cooker can be saved.
- 20 **[0009]** The present disclosure also provides a combustion device having the plug valve.
- [0010]** According to embodiments of the present disclosure, the plug valve includes a valve body, an electromagnetic valve, and a valve core. The valve body internally has a valve core accommodation cavity, a gas inlet channel, an outer ring channel, an inner ring channel, and an electromagnetic valve accommodation cavity. The electromagnetic valve accommodation
- 25 cavity is located between the gas inlet channel and the valve core accommodation cavity. The electromagnetic valve is located in the electromagnetic valve accommodation cavity to enable or disable communication between the gas inlet channel and the valve core accommodation cavity. The valve core is located in the valve core accommodation cavity. The valve core has an

inner ring gas channel and an outer ring gas channel. The inner ring gas channel is configured to communicate the valve core accommodation cavity with the inner ring channel, and the outer ring gas channel is configured to communicate the valve core accommodation cavity with the outer ring channel. A gas inlet of the gas inlet channel, an outer ring gas outlet of the outer ring channel, and an inner ring gas outlet of the inner ring channel are coplanar and have collinear circle centers.

[0011] According to the embodiments of the present disclosure, the plug valve can have a compact valve body structure by making the gas inlet of the gas inlet channel, the outer ring gas outlet of the outer ring channel, and the inner ring gas outlet of the inner ring channel coplanar. As a result, the realization of the miniaturization of the valve body is facilitated. In this way, provision of an assembly space for installation of other parts of the cooker is also facilitated. Therefore, optimization of an overall mechanism of the cooker is facilitated. By allowing the gas inlet of the gas inlet channel, the outer ring gas outlet of the outer ring channel, and the inner ring gas outlet of the inner ring channel to be each located at a same level, the gas inlet channel, the outer ring channel, and the inner ring channel of the valve body can be better optimized, enabling the gas inlet channel, the outer ring channel, and the inner ring channel to be also located at the same level as much as possible. In this way, the valve body is allowed to have a thin thickness. When the plug valve is assembled, an overall thickness of the cooker can be made thin. Therefore, the internal space of the cooker can be well saved. Moreover, a space utilization rate of a cabinet at a bottom of the cooker is improved.

[0012] In addition, according to the present disclosure, the plug valve may further have the following additional technical features.

[0013] In some embodiments of the present disclosure, the gas inlet channel has a first extending axis; the outer ring channel has a second extending axis; the inner ring channel has a third extending axis; and the first extending axis, the second extending axis, and the third extending axis are each located in a first plane.

[0014] In some embodiments of the present disclosure, the electromagnetic valve accommodation cavity has a fourth extending axis, and the fourth extending axis is located in the first plane.

[0015] In some embodiments of the present disclosure, the first extending axis, the second

extending axis, the third extending axis, and the fourth extending axis are parallel to one another.

[0016] In some embodiments of the present disclosure, the inner ring gas channel has a first gas outlet hole; the outer ring gas channel has a second gas outlet hole; the inner ring channel has a first gas inlet hole corresponding to the first gas outlet hole; and the outer ring channel has a second gas inlet hole corresponding to the second gas outlet hole. The first gas outlet hole is spaced apart from the second gas outlet hole in a height direction of the valve core.

[0017] In some embodiments of the present disclosure, a plurality of first gas outlet holes and a plurality of second gas outlet holes are provided, the plurality of first gas outlet holes and the plurality of second gas outlet holes are each arranged at intervals in a first direction.

[0018] In some embodiments of the present disclosure, in the first direction, the plurality of first gas outlet holes and the plurality of second gas outlet holes have hole diameters gradually increasing, or the plurality of first gas outlet holes and the plurality of second gas outlet holes have hole diameters gradually decreasing.

[0019] In some embodiments of the present disclosure, the valve core has a first region with the plurality of first gas outlet holes and a second region with the plurality of second gas outlet holes. A central angle a of the first region satisfies: $180^{\circ} \leq a \leq 270^{\circ}$, and a central angle b of the second region satisfies: $180^{\circ} \leq b \leq 270^{\circ}$.

[0020] In some embodiments of the present disclosure, the central angle a of the first region and the central angle b of the second region satisfy: $a > b$.

[0021] In some embodiments of the present disclosure, the inner ring channel has a first transition portion at an end of the inner ring channel facing towards the valve core accommodation cavity, in the height direction of the valve core, the first transition portion extends to a position above and/or below the second gas inlet hole to enable the first gas inlet hole to be spaced apart from the second gas inlet hole; or the outer ring channel has a second transition portion at an end of the outer ring channel facing towards the valve core accommodation cavity, in the height direction of the valve core, the second transition portion extends to a position above and/or below the first gas inlet hole to enable the first gas inlet hole to be spaced apart from the second gas inlet hole.

[0022] In some embodiments of the present disclosure, the first transition portion includes an inclined tube extending obliquely upwards or downwards in a direction where the inner ring

channel leads to the valve core accommodation cavity.

[0023] In some embodiments of the present disclosure, the plug valve further includes: a valve stem configured to drive the valve core to enable the valve core to rotate in the valve core accommodation cavity; and a damping stop block located on the valve body and configured to prevent a rotation of the valve stem or a rotation of the valve core when the valve core rotates to a corresponding stop position.

[0024] In some embodiments of the present disclosure, the damping stop block includes a plurality of stop members corresponding to a plurality of stop positions. Each of the plurality of stop members is configured to emit a different sound effect when being triggered.

[0025] The present disclosure further provides a combustion device having the plug valve.

[0026] For the combustion device according to the embodiments of the present disclosure, the layout of the combustion device can be better optimized by providing the plug valve as described in the above examples. Meanwhile, the plug valve is simple in structure and convenient to operate. Moreover, during layout of pipelines of the combustion device, the pipelines of the combustion device can be far away from a combustor due to the structure of the plug valve. In this way, the plug valve is not easily damaged and has a suitable temperature. Therefore, user's usage experience feeling is good.

[0027] In some examples, the combustion device may be a gas stove, a combustion boiler, or a predetermined segment of gas pipelines of a large combustion system, which is not limited herein.

[0028] Additional aspects and advantages of the present disclosure will be provided in part in the following description, or will become apparent in part from the following description, or can be learned from practicing of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The above and/or additional aspects and advantages of the present disclosure will become more apparent and more understandable from the following description of embodiments taken in conjunction with the accompanying drawings, in which:

[0030] FIG. 1 is a perspective view of a plug valve according to an embodiment of the

present disclosure.

[0031] FIG. 2 is an exploded view of a plug valve according to an embodiment of the present disclosure.

5 [0032] FIG. 3 is a vertical view of a plug valve according to an embodiment of the present disclosure.

[0033] FIG. 4 is a cross-sectional view taken along line A-A in FIG. 3.

[0034] FIG. 5 is a cross-sectional view taken along line C-C in FIG. 3.

[0035] FIG. 6 is a cross-sectional view taken along line D-D in FIG. 3.

10 [0036] FIG. 7 is a front view of a plug valve according to an embodiment of the present disclosure.

[0037] FIG. 8 is a schematic structural view of a valve body of a plug valve according to an embodiment of the present disclosure.

[0038] FIG. 9 is a schematic structural view of a plug valve with a separated electromagnetic valve according to an embodiment of the present disclosure.

15 [0039] FIG. 10 is a schematic structural view of a valve core of a plug valve according to an embodiment of the present disclosure.

[0040] Reference numerals:

[0041] plug valve 100,

20 [0042] valve body 1, valve core accommodation pipe 11, valve core accommodation cavity 111, gas inlet pipe 12, gas inlet 121, outer ring pipe 13, outer ring gas outlet 131, second gas inlet hole 132, inner ring pipe 14, inner ring channel 140, inner ring gas outlet 141, first gas inlet hole 142, inclined pipe 143, electromagnetic valve accommodation pipe 15, electromagnetic valve accommodation cavity 151, first communication pipe 16, second communication pipe 17,

25 [0043] first extending axis X1, second extending axis X2, third extending axis X3, fourth extending axis X4,

[0044] electromagnetic valve 2,

[0045] valve core 3, first gas outlet hole 31, second gas outlet hole 32,

30 [0046] valve stem 41, protruding block 411, damping stop block 42, opening retainer ring 43, pressing plate 44, valve seat 45, valve needle 46, valve core spring 47, gasket 48, O-ring 49,

plug screw 50, microswitch 51, bottom plate sealing ring 52, toggle lever 53, first toggle lug 531, second toggle lug 532, bottom plate 54, transmission block 55,

[0047] first fastening screw 61, second fastening screw 62, third fastening screw 63, fourth fastening screw 64, fifth fastening screw 65.

5

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0048] Embodiments of the present disclosure will be described in detail below with reference to examples thereof as illustrated in the accompanying drawings, throughout which same or similar elements, or elements having same or similar functions, are denoted by same or similar reference numerals. The embodiments described below with reference to the drawings are illustrative only, and are intended to explain, rather than limiting, the present disclosure.

[0049] A plug valve 100 according to the embodiments of the present disclosure are described below with reference to FIG. 1 to FIG. 10.

[0050] As illustrated in FIG. 1, FIG. 2, FIG. 4, and FIG. 6, the plug valve 100 according to an embodiment of the present disclosure includes a valve body 1, an electromagnetic valve 2, and a valve core 3. The valve body 1 internally has a valve core accommodation cavity 111, a gas inlet channel, an outer ring channel, an inner ring channel 140, and an electromagnetic valve accommodation cavity 151. The electromagnetic valve accommodation cavity 151 is located between the gas inlet channel and the valve core accommodation cavity 111. The electromagnetic valve 2 is located in the electromagnetic valve accommodation cavity 151 to enable or disable communication between the gas inlet channel and the valve core accommodation cavity 111.

[0051] A plug valve 100 for a gas stove as illustrated in FIG. 2 and FIG. 4 is taken as an example. The plug valve 100 includes a valve body 1, an electromagnetic valve 2, and a valve core 3. The plug valve 100 further includes a valve stem 41. The valve stem 41 has a valve needle 46 disposed at a lower end of the valve stem 41. The valve needle 46 has a toggle lever 53 disposed at a lower end of the valve needle 46. The toggle lever 53 includes a lever body, a first toggle lug 531, and a second toggle lug 532. When the valve stem 41 is driven to move

downwards, the valve needle 46 may abut against the first toggle lug 531. When the valve stem 41 drives the valve needle 46 to continue moving downwards, the valve needle 46 may drive the toggle lever 53 to rotate the toggle lever 53 about an axis X of the toggle lever 53. Rotation of the toggle lever 53 can drive the second toggle lug 532 to rotate about the axis of the toggle lever, which enables the second toggle lug 532 to drive the electromagnetic valve 2, enabling the electromagnetic valve 2 to unlock its blocking against the electromagnetic valve accommodation cavity 151. In this way, the electromagnetic valve accommodation cavity 151 can connect the gas inlet channel and the valve core accommodation cavity 111. Therefore, external gas can enter the electromagnetic valve accommodation cavity through the gas inlet channel and further enter the valve core accommodation cavity 111. The gas entering the valve core accommodation cavity 111 may enter the outer ring channel and the inner ring channel 140, respectively. Further, the gas is supplied to a big fire ejector tube and a small fire ejector tube.

[0052] It should be noted that the present disclosure is mainly described by taking the plug valve 100 on the gas stove as an example. However, the plug valve 100 of the present disclosure may also not be used only for gas stoves, but may also be used in other gas devices. In addition, the plug valve 100 of the present disclosure may also be applied in a pipeline system for carrying liquid, or other pipeline systems for transporting gas, which is not specifically limited herein.

[0053] Further, the valve core 3 is located in the valve core accommodation cavity 111. The valve core 3 has an inner ring gas channel and an outer ring gas channel. The inner ring gas channel is configured to communicate the valve core accommodation cavity 111 with the inner ring channel 140, and the outer ring gas channel is configured to communicate the valve core accommodation cavity 111 with the outer ring channel, i.e., the gas entering the valve core accommodation cavity 111 may enter the inner ring gas channel and the outer ring gas channel, respectively. Moreover, the gas in the inner ring gas channel may enter the inner ring channel 140, and the gas in the outer ring gas channel may enter the outer ring channel.

[0054] Further, a gas inlet 121 of the gas inlet channel, an outer ring gas outlet 131 of the outer ring channel, and an inner ring gas outlet 141 of the inner ring channel 140 are coplanar, i.e., the gas inlet 121 of the gas inlet channel, the outer ring gas outlet 131 of the outer ring channel, and the inner ring gas outlet 141 of the inner ring channel 140 are each located at a

same side of the valve body 1. As an example, the gas stove has two knobs. Two plug valves 100 are provided below the two knobs. Moreover, gas inlets 121, outer ring gas outlets 131, and inner ring gas outlets 141 of the two plug valves 100 are each located on a same side. In this way, a center distance between the two knobs can be effectively shortened. Moreover, beautification of an appearance of a cooker can be facilitated. In addition, it should be further noted that, in response to the center distance between the knobs being increased, it is easy to make the knob closer to a burner when a cooker pipeline is configured. In this way, a temperature of the knob can be easily increased, which not only easily damages the knob, but also affects a user's usage experience after the knob is made overheated. Therefore, in the present disclosure, after the center distance between the two knobs is reduced, a service life of the knob can be well prolonged. Meanwhile, the usage experience of the user can also be improved.

[0055] In addition, in the present disclosure, the gas inlet 121 of the gas inlet channel, the outer ring gas outlet 131 of the outer ring channel, and the inner ring gas outlet 141 of the inner ring channel 140 are coplanar, which can also make the valve body 1 of the present disclosure compact in structure, facilitating realization of miniaturization of the valve body 1. In this way, it can be beneficial to provide an assembly space for installation of other parts of the cooker. Therefore, optimization of an overall mechanism of the cooker is facilitated.

[0056] In an example of the present disclosure, the gas inlet 121 of the gas inlet channel, the outer ring gas outlet 131 of the outer ring channel, and the inner ring gas outlet 141 of the inner ring channel 140 each have collinear circle centers. It can be understood that in order to ensure efficiency of gas intake of the gas inlet 121 or gas outflow of the gas outlet, the gas inlet 121 or the gas outlet is usually set to be circular. Therefore, the gas inlet 121 of the gas inlet channel, the outer ring gas outlet 131 of the outer ring channel, and the inner ring gas outlet 141 of the inner ring channel 140 each have a circle center point, which allows the gas inlet 121 of the gas inlet channel, the outer ring gas outlet 131 of the outer ring channel, and the inner ring gas outlet 141 of the inner ring channel 140 to have collinear circle center points. In this way, it can be beneficial to a reduction in a thickness of the valve body 1. That is, when the gas inlet 121 of the gas inlet channel, the outer ring gas outlet 131 of the outer ring channel, and the inner ring gas outlet 141 of the inner ring channel 140 are each located at a same level, optimization

can be better performed on the gas inlet channel, the outer ring channel, and the inner ring channel 140 of the valve body 1, enabling the gas inlet channel, the outer ring channel, and the inner ring channel 140 to be also at the same level as much as possible. In this way, the valve body 1 can be allowed to have a thin thickness. When the plug valve 100 is assembled, an overall thickness of the cooker can be made thin. Therefore, an internal space of the cooker can be well saved. In addition, a space utilization rate of a cabinet at a bottom of the cooker is improved.

[0057] Therefore, with the plug valve 100 according to the embodiments of the present disclosure, the valve body 1 of the present disclosure has a compact structure by making the gas inlet 121 of the gas inlet channel, the outer ring gas outlet 131 of the outer ring channel, and the inner ring gas outlet 141 of the inner ring channel 140 coplanar, which is beneficial to the miniaturization of the valve body 1. In this way, provision of the assembly space for the installation of other parts of the cooker can be facilitated. Therefore, the optimization of the overall mechanism of the cooker is facilitated. By allowing the gas inlet 121 of the gas inlet channel, the outer ring gas outlet 131 of the outer ring channel, and the inner ring gas outlet 141 of the inner ring channel 140 to be each located at the same level, the gas inlet channel, the outer ring channel, and the inner ring channel 140 of the valve body 1 can be better optimized, enabling the gas inlet channel, the outer ring channel, and the inner ring channel 140 to be also located at the same level as much as possible. In this way, the valve body 1 is allowed to have a thin thickness. When the plug valve 100 is assembled, the overall thickness of the cooker can be made thin. Therefore, the internal space of the cooker can be well saved. Moreover, the space utilization rate of the cabinet at the bottom of the cooker is improved.

[0058] In an example of the present disclosure, mounting of a plug valve of an ultra-thin structure only occupies a space of 18 mm. In this way, the internal space of the cooker can be saved. Moreover, the plug valve can be applied to an ultra-thin stove, an integrated stove, and a combined stove, increasing a use space of a functional module at the bottom of the cooker.

[0059] In some embodiments of the present disclosure, as illustrated in FIG. 3, FIG. 4, and FIG. 6, the gas inlet channel has a first extending axis X1. The outer ring channel has a second extending axis X2. The inner ring channel 140 has a third extending axis X3. The first extending axis X1, the second extending axis X2, and the third extending axis X3 are each located in a

first plane. That is, in the present disclosure, the gas inlet channel, the outer ring channel, and the inner ring channel 140 are allowed to be located at the same level. In this way, the valve body 1 can be allowed to have a thin thickness. When the plug valve 100 is assembled, the overall thickness of the cooker can be made thin. Therefore, the internal space of the cooker can be well saved. Moreover, the space utilization rate of the cabinet at the bottom of the cooker is improved.

[0060] Further, the electromagnetic valve accommodation cavity 151 has a fourth extending axis X4, and the fourth extending axis X4 is located in the first plane. Further, the first extending axis X1, the second extending axis X2, the third extending axis X3, and the fourth extending axis X4 are parallel to one another.

[0061] For example, as illustrated in FIG. 2, FIG. 3, FIG. 4, and FIG. 6, the gas inlet channel is formed by a gas inlet pipe 12 and a first communication pipe 16. The gas inlet pipe 12 extends in a front-rear direction and has the first extending axis X1. The first communication pipe 16 extends in a left-right direction. The electromagnetic valve accommodation cavity 151 extends in the front-rear direction. A rear end of the gas inlet pipe 12 penetrates a pipe wall of the first communication pipe 16. In this way, the gas inlet pipe 12 is allowed to be in communication with the first communication pipe 16. A right end of the first communication pipe 16 penetrates a pipe wall of the electromagnetic valve accommodation pipe 15 to be in communication with an electromagnetic valve accommodation cavity of the electromagnetic valve accommodation pipe 15. Further, the inner ring channel 140 includes an inner ring pipe 14. A rear end of the inner ring pipe 14 extends to a lower end of the valve core accommodation cavity 111, which allows the inner ring channel 140 of the inner ring pipe 14 to be in communication with the valve core accommodation cavity 111. The inner ring pipe 14 has the third extending axis X3. The outer ring channel is formed by an outer ring pipe 13 and a second communication pipe 17. The outer ring pipe 13 extends in the front-rear direction. The second communication pipe 17 extends in the left-right direction. The outer ring pipe 13 has the second extending axis X2. A rear end of the outer ring pipe 13 penetrates a pipe wall of the second communication pipe 17, which allows the outer ring pipe 13 to be in communication with the second communication pipe 17. Moreover, a left end of the second communication pipe 17 is in communication with the valve core accommodation cavity 111. In this way, the structure of the valve body 1 can be

made compact. Moreover, a reduction in a volume of the valve body 1 can be facilitated. Therefore, the miniaturization design of the plug valve 100 is realized.

[0062] In the valve body 1 according to the above examples of the present disclosure, a left end of the first communication pipe 16 may be blocked by a plug screw 50, and a right end of the second communication pipe 17 may also be blocked by the plug screw 50.

[0063] In addition, according to the above example, it can be further understood that the above example is merely a preferred example for realizing the miniaturization of the plug valve 100 or the miniaturization of the valve body 1. Moreover, for the valve body 1 of the present disclosure, other reasonable structural designs can also be performed on a structure of each of the gas inlet channel, the outer ring channel, the inner ring channel 140, and the electromagnetic valve accommodation cavity 151 as desired. For example, only the first extending axis X1, the second extending axis X2, and the third extending axis X3 are made parallel to one another, but the fourth extending axis X4 is not parallel to the first extending axis X1, the second extending axis X2, and the third extending axis X3. For another example, the first extending axis X1 to the fourth extending axis X4 are parallel to one another, yet non-coplanar. In other embodiments of the present disclosure, various other examples may exist, which are not exhaustively enumerated herein.

[0064] In a further example, the first communication pipe 16 and the second communication pipe 17 may also be obliquely disposed as needed during their extending in the left-right direction. For example, the first communication pipe 16 and the second communication pipe 17 are inclined upwards, or inclined downwards, or inclined forwards, or inclined backwards in a left-to-right direction, which is not limited herein.

[0065] In a further example, the gas inlet pipe 12, the outer ring pipe 13, and the inner ring pipe 14 may have a same pipe diameter. Moreover, the gas inlet 121 of the gas inlet channel, the outer ring gas outlet 131 of the outer ring channel, and the inner ring gas outlet 141 of the inner ring channel 140 may also have a same area, which may be set as desired, and is not limited in the present disclosure.

[0066] In some embodiments of the present disclosure, the inner ring gas channel has a first gas outlet hole 31. The outer ring gas channel has a second gas outlet hole 32. The inner ring channel 140 has a first gas inlet hole 142 corresponding to the first gas outlet hole 31. The outer

ring channel has a second gas inlet hole 132 corresponding to the second gas outlet hole 32. The first gas outlet hole 31 is spaced apart from the second gas outlet hole 32 in a height direction of the valve core 3.

[0067] For example, as illustrated in FIG. 2, FIG. 8, and FIG. 10, on an outer wall surface of the valve core 3, the first gas outlet hole 31 is located above the second gas outlet hole 32. In this way, compared with disposing the first gas outlet hole 31 and the second gas outlet hole 32 at a same level of the valve core 3, in the present disclosure, the first gas outlet hole 31 and the second gas outlet hole 32 are spaced apart from each other in an up-down direction. In this way, machining of the first gas outlet hole 31 and the second gas outlet hole 32 can be facilitated. Therefore, interference between the first gas outlet hole 31 and the second gas outlet hole 32 is not easy to occur. In addition, when flame intensity of the cooker is adjusted in a manner of rotating the valve core 3, the valve core 3 can have more rotational degrees of freedom. In this way, when the flame intensity is graded, flame intensity corresponding to the first gas outlet hole 31 and the second gas outlet hole 32 can be graded in more detail, to realize more detailed cooker combustion grading. Therefore, a requirement of a user for different sizes of flame intensity can be satisfied.

[0068] In another exemplary embodiment of the present disclosure, a plurality of first gas outlet holes 31 and a plurality of second gas outlet holes 32 are each provided. The plurality of first gas outlet holes 31 and the plurality of second gas outlet holes 32 are each arranged at intervals in a first direction. As illustrated in FIG. 10, the first direction is a clockwise direction of the valve core 3 illustrated in FIG. 10. In other embodiments of the present disclosure, it can be understood that the first gas outlet hole 31 and the second gas outlet hole 32 are allowed to be spaced apart from each other in the up-down direction. Such being the case, a large layout space may occur between the first gas outlet hole 31 and the second gas outlet hole 32. In this way, the first gas outlet hole 31 and the second gas outlet hole 32 can be disposed around a peripheral wall of the valve core 3 in an oblique upward direction. In this way, the plurality of the first gas outlet holes 31 and the plurality of second gas outlet holes 32 can be allowed to each have a same hole diameter. Such being the case, when the valve core 3 rotates, the first gas outlet hole 31 and the first gas inlet hole 142 can have different relative communication areas along with rotation, realizing flame intensity regulation. It can be seen therefrom that the

first gas outlet holes 31 and the second gas outlet holes 32 may also be uniformly arranged at intervals in a second direction or in a third direction as desired. Therefore, the present disclosure does not limit this, and the above is merely as an example.

[0069] Further, when the first gas outlet holes 31 and the second gas outlet holes 32 are each arranged at intervals in the first direction, in an example, the plurality of first gas outlet holes 31 and the plurality of second gas outlet holes 32 have hole diameters gradually increasing. Therefore, when the valve core 3 rotates in the first direction, an area where the first gas outlet hole 31 is in communication with the first gas inlet 121 is allowed to gradually increase, and an area where the second gas outlet hole 32 is in communication with the second gas inlet hole 132 is allowed to gradually increase. In another example, the plurality of first gas outlet holes 31 and the plurality of second gas outlet holes 32 have hole diameters gradually decreasing. Therefore, when the valve core 3 rotates in the first direction, the area where the first gas outlet hole 31 is in communication with the first gas inlet 121 is allowed to gradually decrease, and the area where the second gas outlet hole 32 is in communication with the second gas inlet hole 132 is allowed to gradually decrease. It can be seen therefrom that in the present disclosure, the size of flame intensity can be regulated by changing the hole diameter of the first gas outlet hole 31 and the hole diameter of the second gas outlet hole 32. With the layout of the first gas outlet hole 31 and the second gas outlet hole 32 illustrated in FIG. 10, when the valve core 3 rotates from the most initial position by 90° in the first direction, it is maximum flame intensity of the cooker. The example of 90° may be used as one of preferred examples. There may also be examples of rotating by 95°, 100°, 96°, and the like, which are not limited herein.

[0070] In an embodiment of the present disclosure, the valve core 3 has a first region with the plurality of first gas outlet holes 31. A central angle α of the first region satisfies: $180^\circ \leq \alpha \leq 270^\circ$, i.e., the first gas outlet hole 31 may be disposed in a range from 180° to 270° of the valve core 3. In this way, the valve core 3 can be allowed to rotate in the range from 180° to 270° when the size of the flame intensity is adjusted through adjustment of the first gas outlet hole 31, with a great rotation region and a large adjustable region. Therefore, realization of detail division of flame intensity can be facilitated. The central angle α may be 180°, 183°, 186°, 187°, 250°, and the like, which is not limited herein.

[0071] In another example of the present disclosure, the valve core 3 has a second region

with the plurality of second gas outlet holes 32, and a central angle b of the second region satisfies: $180^{\circ} \leq b \leq 270^{\circ}$, i.e., the second gas outlet hole 32 may be disposed in the range from 180° to 270° of the valve core 3. In this way, the valve core 3 can be allowed to rotate in the range from 180° to 270° when the size of the flame intensity is adjusted through adjustment of the second gas outlet hole 32, with a great rotation region and a large adjustable region. Therefore, the realization of the detail division of flame intensity can be facilitated. The central angle a may be 180° , 183° , 186° , 187° , 250° , and the like, which is not limited herein.

[0072] The present disclosure further includes other optional examples. For example, the central angle a of the first region is the same as the central angle b of the second region, or the central angle a of the first region and the central angle b of the second region satisfy: $a > b$, which may be specifically provided as desired and are not limited herein.

[0073] In some embodiments of the present disclosure, the inner ring channel 140 has a first transition portion at an end of the inner ring channel 140 facing towards the accommodation cavity of the valve core 3. In the height direction of the valve core 3, the first transition portion extends to a position above and/or below the second gas inlet hole 132 to enable the first gas inlet hole 142 to be spaced apart from the second gas inlet hole 132. Alternatively, the outer ring channel has a second transition portion at an end of the outer ring channel facing towards the accommodation cavity of the valve core 3. In the height direction of the valve core 3, the second transition portion extends to a position above and/or below the first gas inlet hole 142 to enable the first gas inlet hole 142 to be spaced apart from the second gas inlet hole 132.

[0074] In a first example, the inner ring channel 140 has a first transition portion at an end of the inner ring channel 140 facing towards the accommodation cavity of the valve core 3. In the height direction of the valve core 3, the first transition portion extends to a position above the second gas inlet hole 132 to enable the first gas inlet hole 142 and the second gas inlet hole 132 to be spaced apart from each other. In this way, the first gas outlet hole 31 engaged with the first gas inlet hole 142 is located above the second gas outlet hole 32. When the plurality of first gas outlet holes 31 have unequal hole diameters, the hole diameter of the first gas inlet hole 142 may be greater than a hole diameter of the maximum second gas outlet hole 32, or the hole diameter of the first gas inlet hole 142 may also be equal to the hole diameter of the maximum

second gas outlet hole 32.

[0075] In a second example, the inner ring channel 140 has a first transition portion at an end of the inner ring channel 140 facing towards the accommodation cavity of the valve core 3. In the height direction of the valve core 3, the first transition portion extends to a position below the second gas inlet hole 132 to enable the first gas inlet hole 142 and the second gas inlet hole 132 to be spaced apart from each other. In this way, the first gas outlet hole 31 engaged with the first gas inlet hole 142 is located below the second gas outlet hole 32.

[0076] In a third example, the outer ring channel has a second transition portion at an end of the outer ring channel facing towards the accommodation cavity of the valve core 3. In the height direction of the valve core 3, the second transition portion extends to a position above the first gas inlet hole 142 to enable the first gas inlet hole 142 and the second gas inlet hole 132 to be spaced apart from each other. In this way, the first gas outlet hole 31 engaged with the first gas inlet hole 142 is located below the second gas outlet hole 32.

[0077] In a fourth example, the outer ring channel has a second transition portion at an end of the outer ring channel facing towards the accommodation cavity of the valve core 3. In the height direction of the valve core 3, the second transition portion extends to a position below the first gas inlet hole 142 to enable the first gas inlet hole 142 and the second gas inlet hole 132 to be spaced apart from each other. In this way, the first gas outlet hole 31 engaged with the first gas inlet hole 142 is located above the second gas outlet hole 32.

[0078] In another exemplary embodiment of the present disclosure, as illustrated in FIG. 2, FIG. 4, FIG. 8, and FIG. 9, the first transition portion includes an inclined tube 143. The inclined tube 143 extending obliquely upwards or extends obliquely downwards in a direction where the inner ring channel 140 leads to the accommodation cavity of the valve core 3. For example, in the direction where the inner ring channel 140 leads to the accommodation cavity of the valve core 3, the inclined tube 143 extends obliquely upwards. In this way, the structure is simple. Moreover, positioning of the first gas inlet hole 142 and the second gas inlet hole 132 in the up-down direction can be well realized. Therefore, no great change in the structure of the valve body 1 is required. In other embodiments of the present disclosure, it can be understood that the second transition portion may also include the inclined tube 143, which is omitted herein.

[0079] In some embodiments of the present disclosure, the plug valve 100 further includes

a valve stem 41 and a damping stop block 42. The valve stem 41 is configured to drive the valve core 3 to enable the valve core 3 to rotate in the valve core accommodation cavity 111. The damping stop block 42 is located on the valve body 1 and configured to prevent a rotation of the valve stem 41 or a rotation of the valve core 3 when the valve core 3 rotates to a corresponding stop position.

5 [0080] In a specific example illustrated in FIG. 2, FIG. 4, and FIG. 6, the plug valve 100 includes a valve body 1. The valve body 1 has a valve core accommodation cavity 111. The valve core 3 is located in the valve core accommodation cavity 111. A valve seat 45 is provided above the valve core accommodation cavity 111. The valve seat 45 is assembled on the valve body 1 to enclose the valve core accommodation cavity 111. A through hole is formed on the valve seat 45 and allows the valve stem 41 to pass through. The valve seat 45 has a damping stop block 42 mounted thereon. The damping stop block 42 is sleeved on the valve stem 41. When the valve stem 41 rotates, the damping stop block 42 affects the rotation of the valve stem 41, enabling the user to have a predetermined touch feeling when the knob is driven to rotate.

10 15 When the valve stem 41 rotates to the corresponding stop position, the damping stop block 42 may limit the rotation of the valve stem 41. In this way, when the user needs to drive the knob to rotate to a next stop position, an acting force applied to the knob needs to be increased. In this way, a clear stop position prompt can be given to the user. In this way, the user does not need to lower the head to check whether to rotate to the corresponding stop position. Therefore, the operation is simple. Moreover, the user's usage experience can be improved.

20 [0081] In an optional example, the damping stop block 42 may have a damping protrusion formed thereon, and the valve stem 41 has a groove formed thereon. In this way, when the valve stem 41 rotates to the corresponding stop position, the damping protrusion may enter the groove. Therefore, the user needs to use a greater force to enable the damping protrusion to move out of the groove.

[0082] In another optional example, it may also be that the damping stop block 42 has a groove formed thereon, and the valve stem 41 has a corresponding protrusion formed thereon. In this way, the protrusion may enter the groove. Therefore, the user needs to use a greater force to enable the protrusion to move out of the groove.

30 [0083] In another exemplary embodiment of the present disclosure, the damping stop block

42 includes a plurality of stop members. The plurality of stop members corresponds to a plurality of stop positions. Each of the plurality of stop members is configured to emit a different sound effect when being triggered, i.e., when a stop lever rotates to different stop positions, different stop members may be triggered. In this way, different stop members are caused to emit different sound effects. For example, the sound effects may be “ding,” “clang,” “thud,” and the like, which is not limited herein.

[0084] In a further example, the damping stop block 42 may also include only one stop member. When the stop lever rotates to a stop position, the stop member may be triggered. In this way, the stop member emits a sound effect.

[0085] The present disclosure further provides a combustion device having the plug valve 100.

[0086] For the combustion device according to the embodiments of the present disclosure, the layout of the combustion device can be better optimized by providing the plug valve 100 as described in the above examples. Meanwhile, the plug valve 100 is simple in structure and convenient to operate. Moreover, during layout of pipelines of the combustion device, the pipelines of the combustion device can be far away from the combustor due to the structure of the plug valve 100. In this way, the plug valve 100 is not easily damaged and has a suitable temperature. Therefore, the user’s usage experience feeling is good.

[0087] In some examples, the combustion device may be a gas stove, a combustion boiler, or a predetermined segment of gas pipelines of a large combustion system, which is not limited herein.

[0088] Referring to FIG. 1 to FIG. 10, a schematic structural view of a plug valve 100 of a gas stove according to a specific embodiment is described.

[0089] As illustrated in FIG. 2, FIG. 4, FIG. 6, and FIG. 8, the plug valve 100 includes a valve body 1. The valve body 1 internally has a valve core accommodation cavity 111, a gas inlet channel, an outer ring channel, an inner ring channel 140, and an electromagnetic valve accommodation cavity 151.

[0090] Referring again to FIG. 3, the gas inlet channel is formed by a gas inlet pipe 12 and a first communication pipe 16. The gas inlet pipe 12 extends in a front-rear direction. The gas inlet pipe 12 has a first extending axis X1. The first communication pipe 16 extends in a left-

right direction. The electromagnetic valve accommodation cavity 151 extends in the front-rear direction. A rear end of the gas inlet pipe 12 passes through a pipe wall of the first communication pipe 16, enabling the gas inlet pipe 12 to be in communication with the first communication pipe 16. A right end of the first communication pipe 16 passes through a pipe wall of an electromagnetic valve accommodation pipe 15 to be in communication with an electromagnetic valve accommodation cavity of the electromagnetic valve accommodation pipe 15. Further, the inner ring channel 140 includes an inner ring pipe 14. A rear end of the inner ring pipe 14 extends to a lower end of the valve core accommodation cavity 111, allowing the inner ring channel 140 of the inner ring pipe 14 to be in communication with the valve core accommodation cavity 111. The inner ring pipe 14 has a third extending axis X3. The outer ring channel is formed by an outer ring pipe 13 and a second communication pipe 17. The outer ring pipe 13 extends in the front-rear direction. The second communication pipe 17 extends in the left-right direction. The outer ring pipe 13 has a second extending axis X2. A rear end of the outer ring pipe 13 passes through a pipe wall of the second communication pipe 17. In this way, the outer ring pipe 13 is allowed to be in communication with the second communication pipe 17. A left end of the second communication pipe 17 is in communication with the valve core accommodation cavity 111. A left end of the first communication pipe 16 may be blocked by a plug screw 50, and a right end of the second communication pipe 17 may also be blocked by the plug screw 50.

[0091] The valve core accommodation cavity 111 is located in a valve core accommodation pipe 11 that vertically extends. A valve seat 45 is mounted above the valve core accommodation pipe 11 to enclose the valve core accommodation cavity 111. A through hole is formed on the valve seat 45 and allows the valve stem 41 to pass through. A damping stop block 42 is mounted on the valve seat 45. The damping stop block 42 is sleeved on the valve stem 41. When the valve stem 41 rotates, the damping stop block 42 affects the rotation of the valve stem 41, enabling the user to have a predetermined touch feeling when the knob is driven to rotate. When the valve stem 41 rotates to the corresponding stop position, the damping stop block 42 can limit the rotation of the valve stem 41. In this way, when the user needs to drive the knob to rotate to the next stop position, the acting force applied to the knob needs to be increased. In this way, a clear stop position prompt can be given to the user. In this way, the user does not

need to lower the head to check whether to rotate to the corresponding stop position, with a simple operation. Therefore, the user's usage experience can be improved. In addition, the damping stop block 42 may include a stop member. When the valve stem 41 triggers the stop member, a sound can be made by the stop member, to better prompt the user that the stop member has been rotated to the corresponding stop position. In this way, the user does not need to lower the head for checking. Therefore, the user's usage experience can be improved.

5 [0092] A lower end of the valve stem 41 extends into the valve seat 45. The valve stem 41 has a boss disposed at the lower end of the valve stem 41. The valve seat 45 and the valve core 3 both have an engagement groove formed thereon. The boss may be engaged with the engagement groove. The valve stem 41 has a valve needle 46 disposed at a lower end of the valve stem 41, i.e., the valve needle 46 has an end abutting against the valve stem 41 and another end extending into the valve core 3. The valve needle 46 extending into the valve core 3 is sleeved with a gasket 48, an O-ring 49, and a valve core spring 47. In this way, under the action of the valve core spring 47, the valve needle 46 is enabled to be at a first position. At this time, 10 the boss of the valve stem 41 is engaged with the engagement groove of the valve seat 45. In this way, the valve stem 41 cannot rotate under the action of the engagement groove of the valve seat 45. When the valve stem 41 is driven to move downwards, the acting force can overcome an elastic force of the valve core spring 47. In this way, the boss of the valve stem 41 can be disengaged from the engagement groove of the valve seat 45. At this time, the boss of the valve stem 41 can only be engaged with the engagement groove of the valve core 3. In this way, the valve stem 41 can be rotated. Moreover, the valve stem 41 when rotating can drive the valve core 3 to rotate, enabling the first gas outlet hole 31 on the valve core 3 to be correspondingly engaged with the first gas inlet hole 142 of the inner ring channel 140 and the second gas outlet hole 32 to be engaged with the second gas inlet hole 132 of the outer ring channel. Therefore, 20 the size of flame intensity is adjusted.

[0093] Further, the valve needle 46 has a toggle lever 53 disposed at a lower end of the valve needle 46. The toggle lever 53 is formed with a first toggle lug 531 and a second toggle lug 532. When the valve stem 41 is driven to move downwards, the acting force can overcome the elastic force of the valve core spring 47, enabling the valve needle 46 to abut against the first toggle lug 531. When the valve stem 41 drives the valve needle 46 to continue moving 30

downwards, the valve needle 46 can drive the toggle lever 53 to enable the toggle lever 53 to rotate about an axis X of the toggle lever 53. The rotation of the toggle lever 53 can drive the second toggle lug 532 to rotate about the axis X of the toggle lever 53. In this way, the second toggle lug 532 can be enabled to drive the electromagnetic valve 2, enabling the electromagnetic valve 2 to unlock its blocking for the electromagnetic valve accommodation cavity 151. In this way, the electromagnetic valve accommodation cavity 151 can connect the gas inlet channel and the valve core accommodation cavity 111. The external gas can enter the electromagnetic valve accommodation cavity through the gas inlet channel and then enter the valve core accommodation cavity 111. The electromagnetic valve 2 may be mounted on the electromagnetic valve accommodation pipe 15 through a fastening screw and further has a transmission block 55 disposed at an end of the electromagnetic valve 2 facing towards the toggle lever 53. The second toggle lug 532 may transmit the acting force to the electromagnetic valve 2 through the transmission block 55, enabling the electromagnetic valve 2 to unlock its blocking for the electromagnetic valve accommodation cavity 151.

[0094] A pressing plate 44 is mounted between the valve stem 41 and the valve body 1. An end of the pressing plate 44 is sleeved at an assembly groove of the valve stem 41 and may be limited and fixed by an opening retainer ring 43. Another end of the pressing plate 44 may be positioned in a positioning groove of the valve body 1. In this way, when the valve stem 41 moves downwards, deformation of the pressing plate 44 may occur. When a protruding block 411 of the valve stem 41 rotates to a position corresponding to the engagement groove of the valve seat 45 and stops applying a downward acting force, the valve core spring 47 can regain its original shape. In this way, under the action of the valve core spring 47, the valve stem 41 and the valve needle 46 can move upwards. Moreover, under the action of the pressing plate 44, the valve stem 41 and the valve needle 46 can be prevented from rushing out.

[0095] In addition, the valve body 1 further has an opening formed at a bottom of the valve body 1. The opening can be closed by a bottom plate 54. The bottom plate 54 may be assembled through fastening screws. A bottom plate sealing ring 52 is further provided between the bottom plate 54 and the valve body 1. In this way, a gap between the bottom plate 54 and the valve body 1 is well sealed.

[0096] A microswitch 51 may also be assembled on the valve body 1. The microswitch 51

may be assembled on the valve body 1 through the fastening screw.

[0097] An operation process of the plug valve 100 according to a specific embodiment is described below with reference to the accompanying drawings.

[0098] Firstly, the valve stem 41 is pressed downwards and drives the valve needle 46 to
5 move downwards, enabling the valve needle 46 to drive the first toggle lug 531. The first toggle
lug 531 may drive the toggle lever 53 to integrally rotate about the axis of the toggle lever 53
after receiving the acting force. At this time, the second toggle lug 532 of the toggle lever 53
may drive the transmission block 55 to transmit the acting force to the electromagnetic valve 2.
The electromagnetic valve 2 may unlock its blocking for the electromagnetic valve
10 accommodation cavity 151. In this way, the gas inlet channel is in communication with the
valve core accommodation cavity 111. In addition, the gas can enter the valve core
accommodation cavity 111 from the gas inlet channel.

[0099] The gas entering the valve core accommodation cavity 111 may enter the inner ring
gas channel and the outer ring gas channel of the valve core 3, respectively. At this time, the
15 protruding block 411 of the valve stem 41 is disengaged from the engagement groove of the
valve seat 45. In this way, the valve stem 41 can be rotated. When the valve stem 41 rotates, the
protruding block 411 of the valve stem 41 is engaged with the engagement groove of the valve
core 3. At this time, the valve stem 41 can drive the valve core 3 to rotate. In this way, the first
gas outlet hole 31 of the valve core 3 can face towards the first gas inlet hole 142 of the valve
20 seat 45, and the second gas outlet 32 of the valve core 3 can face towards the second gas inlet
132 of the valve seat 45. Therefore, the gas entering the inner ring gas channel can enter the
inner ring channel 140 through the first gas outlet holes 31, and the gas entering the outer ring
gas channel can enter the outer ring channel through the second gas outlet hole 32. Since the
plurality of first gas outlet holes 31 and the plurality of second gas outlet holes 32 are each
25 provided, at this time, different first gas outlet holes 31 and different second gas outlet holes 32
of the valve core 3 can be allowed to respectively face towards the first gas inlet hole 142 and
the second gas inlet hole 132 of the valve body 1 by rotating the valve stem 41. Therefore,
adjustment is performed on different sizes of the flame intensity.

[00100] Further, when the size of flame intensity is adjusted, the valve body 1 has a valve
30 seat 45. The valve seat 45 has a damping stop block 42. The damping stop block 42 is sleeved

on the valve stem 41. When the valve stem 41 rotates, the damping stop block 42 may be triggered. When the valve stem 41 is rotated to the corresponding stop position, the user can not only feel that the valve stem 41 rotates to the corresponding stop position through touching, but the damping stop block 42 can also be triggered to emit sound effects. In this way, the user is prompted that the valve stem 41 has rotated to the stop position. Therefore, the user does not need to lower the head for checking, and the user's usage experience can be improved.

[00101] When the gas stove is not in use, the valve stem 41 can be rotated reversely or can continue to be rotated forwardly, enabling the protruding block 411 of the valve stem 41 to correspond to the engagement groove of the valve seat 45. At this time, the acting force applied by the user to the valve stem 41 is removed. Under the action of the valve core spring 47, the valve stem 41 and the valve needle 46 may move upwards. At this time, the electromagnetic valve 2 can re-block the electromagnetic valve accommodation cavity 151 to disconnect a communication state between the gas inlet channel and the valve core accommodation cavity 111. Moreover, under the action of the electromagnetic valve 2, the electromagnetic valve 2 may drive the second toggle lug 532 of the toggle lever 53, enabling the toggle lever 53 to rotate to its original position. When the valve stem 41 moves upwards, the valve stem 41 will not rush out under the action of the pressing plate 44.

[00102] Other arrangements and operations of the plug valve 100 and the gas stove according to the embodiments of the present disclosure are known to those of ordinary skill in the art, and the description thereof in detail will omitted herein.

[00103] In the description of this specification, descriptions with reference to the terms "some embodiments", "optionally", "further", or "some examples" etc., mean that specific features, structure, materials or characteristics described in conjunction with the embodiment or example are included in at least one embodiment or example of the present disclosure. In this specification, the schematic representations of the above terms do not necessarily refer to the same embodiment or example. Moreover, the described specific features, structures, materials or characteristics may be combined in any one or more embodiments or examples in a suitable manner.

[00104] Although embodiments of the present disclosure have been illustrated and described, it is conceivable for those of ordinary skilled in the art that various changes, modifications,

replacements, and variations can be made to these embodiments without departing from the principles and spirit of the present disclosure. The scope of the present disclosure shall be defined by the claims as appended and their equivalents.

CLAIMS

What is claimed is:

1. A plug valve, comprising:

a valve body internally having a valve core accommodation cavity, a gas inlet channel, an
5 outer ring channel, an inner ring channel, and an electromagnetic valve accommodation cavity,
the electromagnetic valve accommodation cavity being located between the gas inlet channel
and the valve core accommodation cavity;

an electromagnetic valve located in the electromagnetic valve accommodation cavity to
enable or disable communication between the gas inlet channel and the valve core
10 accommodation cavity; and

a valve core located in the valve core accommodation cavity and having an inner ring gas
channel and an outer ring gas channel, the inner ring gas channel being configured to
communicate the valve core accommodation cavity with the inner ring channel, and the outer
ring gas channel being configured to communicate the valve core accommodation cavity with
15 the outer ring channel,

wherein a gas inlet of the gas inlet channel, an outer ring gas outlet of the outer ring channel,
and an inner ring gas outlet of the inner ring channel are coplanar and have collinear circle
centers.

2. The plug valve according to claim 1, wherein:

20 the gas inlet channel has a first extending axis;

the outer ring channel has a second extending axis;

the inner ring channel has a third extending axis; and

the first extending axis, the second extending axis, and the third extending axis are each
located in a first plane.

25 3. The plug valve according to claim 2, wherein the electromagnetic valve accommodation
cavity has a fourth extending axis, the fourth extending axis being located in the first plane.

4. The plug valve according to claim 3, wherein the first extending axis, the second
extending axis, the third extending axis, and the fourth extending axis are parallel to one another.

5. The plug valve according to any one of claims 1 to 4, wherein:
the inner ring gas channel has a first gas outlet hole;
the outer ring gas channel has a second gas outlet hole;
the inner ring channel has a first gas inlet hole corresponding to the first gas outlet hole;
5 the outer ring channel has a second gas inlet hole corresponding to the second gas outlet hole; and
the first gas outlet hole is spaced apart from the second gas outlet hole in a height direction of the valve core.
6. The plug valve according to claim 5, wherein a plurality of first gas outlet holes and a
10 plurality of second gas outlet holes are provided, the plurality of first gas outlet holes and the plurality of second gas outlet holes being each arranged at intervals in a first direction.
7. The plug valve according to claim 6, wherein in the first direction, the plurality of first gas outlet holes and the plurality of second gas outlet holes have hole diameters gradually increasing, or the plurality of first gas outlet holes and the plurality of second gas outlet holes
15 have hole diameters gradually decreasing.
8. The plug valve according to claim 6 or 7, wherein the valve core has a first region with the plurality of first gas outlet holes and a second region with the plurality of second gas outlet holes, wherein:
a central angle a of the first region satisfies: $180^\circ \leq a \leq 270^\circ$, and
20 a central angle b of the second region satisfies: $180^\circ \leq b \leq 270^\circ$.
9. The plug valve according to claim 8, wherein the central angle a of the first region and the central angle b of the second region satisfy: $a > b$.
10. The plug valve according to any one of claims 5 to 9, wherein:
the inner ring channel has a first transition portion at an end of the inner ring channel facing
25 towards the valve core accommodation cavity, wherein in the height direction of the valve core, the first transition portion extends to a position above and/or below the second gas inlet hole to enable the first gas inlet hole to be spaced apart from the second gas inlet hole; or
the outer ring channel has a second transition portion at an end of the outer ring channel facing towards the valve core accommodation cavity, wherein in the height direction of the
30 valve core, the second transition portion extends to a position above and/or below the first gas

inlet hole to enable the first gas inlet hole to be spaced apart from the second gas inlet hole.

11. The plug valve according to claim 10, wherein the first transition portion comprises an inclined tube extending obliquely upwards or downwards in a direction where the inner ring channel leads to the valve core accommodation cavity.

5 12. The plug valve according to any one of claims 1 to 11, further comprising:

a valve stem configured to drive the valve core to enable the valve core to rotate in the valve core accommodation cavity; and

a damping stop block located on the valve body and configured to prevent a rotation of the valve stem or a rotation of the valve core when the valve core rotates to a corresponding stop
10 position.

13. The plug valve according to claim 12, wherein:

the damping stop block comprises a plurality of stop members corresponding to a plurality of stop positions, and

each of the plurality of stop members is configured to emit a different sound effect when
15 being triggered.

14. A combustion device, comprising the plug valve according to any one of claims 1 to 13.